

FCC Test Report

FCC ID : 2ADPT-IOT
Equipment : IOT Card
Brand Name : Binji
Model Name : IOT-D0070
Applicant : SmartDisplayer Technology Co., Ltd.
No.2-1, Gongjian Rd., Qidu Dist., Keelung City
20647, Taiwan (R.O.C.)
Manufacturer : SmartDisplayer Technology Co., Ltd.
No.2-1, Gongjian Rd., Qidu Dist., Keelung City
20647, Taiwan (R.O.C.)
Standard : 47 CFR FCC Part 15.247

The product was received on Oct. 31, 2018, and testing was started from Nov. 02, 2018 and completed on Nov. 06, 2018. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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PHOTOGRAPHS OF EUT V01



History of this test report

Report No.	Version	Description	Issued Date
FR8O1518AL	01	Initial issue of report	Nov. 13, 2018



Summary of Test Result

Report Clause	Ref. Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	FCC 15.203
3.1	15.207	AC Power-line Conducted Emissions	Not Required	FCC 15.207
3.2	15.247(a)	DTS Bandwidth	PASS	≥500kHz
3.3	15.247(b)	Maximum Conducted Output Power	PASS	Power [dBm]:30
3.4	15.247(e)	Power Spectral Density	PASS	PSD [dBm/3kHz]:8
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	Non-Restricted Bands: >30 dBc
3.6	15.247(d)	Emissions in Restricted Frequency Bands	PASS	Restricted Bands: FCC 15.209

Declaration of Conformity:
The judgment of conformity in the report is based on the measurement results excluding the measurement uncertainty.
Comments and explanations:
None

Reviewed by: Jackson Tsai

Report Producer: Amber Chiu

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	Bluetooth Mode	Ch. Frequency (MHz)	Channel Number
2400-2483.5	LE	2402-2480	0-39 [40]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	BT-LE(1Mbps)	1.0	1TX

Note:

- ♦ Bluetooth LE uses a GFSK (1Mbps) modulation for DSSS.
- ♦ BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	SmartDisplayer	CWS	PCB antenna	-	2.09

For BT function:

For IEEE 802.15.1 Bluetooth mode (1TX/1RX)

The Ant. 1 (port 1) could transmit/receive simultaneously.

1.1.3 EUT Information

Operational Condition	
EUT Power Type	From Battery
EUT Function	<input checked="" type="checkbox"/> Point-to-multipoint <input type="checkbox"/> Point-to-point
Type of EUT	
<input checked="" type="checkbox"/>	Stand-alone
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device)
	Combined Equipment - Brand Name / Model No.: ...
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems)
	Host System - Brand Name / Model No.: ...
<input type="checkbox"/>	Other:

1.1.4 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
BT-LE(1Mbps)	0.628	2.02	393.75u	3k

1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ◆ 47 CFR FCC Part 15
- ◆ ANSI C63.10-2013
- ◆ KDB 558074 D01 v05

1.3 Testing Location Information

Testing Location		
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL : 886-3-327-3456 FAX : 886-3-327-0973
Test site Designation No. TW1190 with FCC.		
<input type="checkbox"/>	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.) TEL : 886-3-656-9065 FAX : 886-3-656-9085
Test site Designation No. TW0006 with FCC.		

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-HY	Andy Lee	24.5°C / 64%	02/Nov/2018
Radiated	03CH02-HY	Patrick Hseih	24.1°C / 52%	06/Nov/2018

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.9 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.3 dB	Confidence levels of 95%
Temperature	0.7 °C	Confidence levels of 95%
Humidity	4 %	Confidence levels of 95%



2 Test Configuration of EUT

2.1 Test Condition

RF Conducted	Abbreviation	Remark
TnomVnom	Tnom	20°C
-	Vnom	3V




2.2 Test Channel Mode

Test Software	DoS
---------------	-----

Mode	PowerSetting
BT-LE(1Mbps)	-
2402MHz	default
2440MHz	default
2480MHz	default

2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands
Test Condition	Conducted measurement at transmit chains

The Worst Case Mode for Following Conformance Tests			
Tests Item	Emissions in Restricted Frequency Bands		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
Operating Mode < 1GHz	CTX		
1	Battery Mode		
Operating Mode > 1GHz	CTX		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT			V



2.4 Support Equipment

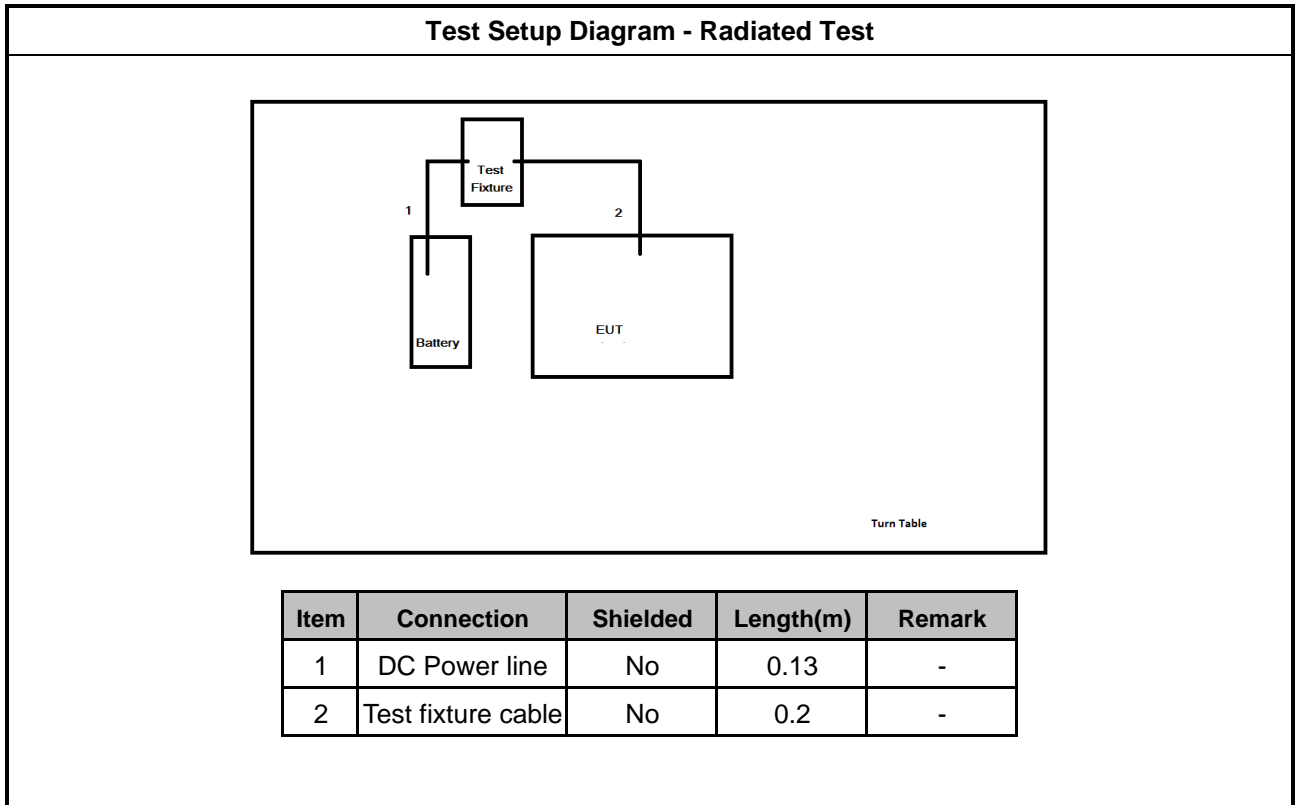
Support Equipment - RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5410	DoC
2	Adapter for NB	DELL	HA65NM130	DoC
3	DC Power Supply	GW	GPS-3030DD	-
4	Test Fixture	-	-	-

Note: Support equipment No.4 was provided by customer.

Support Equipment - Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Test Fixture	-	-	-
2	Battery	-	-	-

Note: Support equipment No.1 & 2 was provided by customer.

2.5 Test Setup Diagram



3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

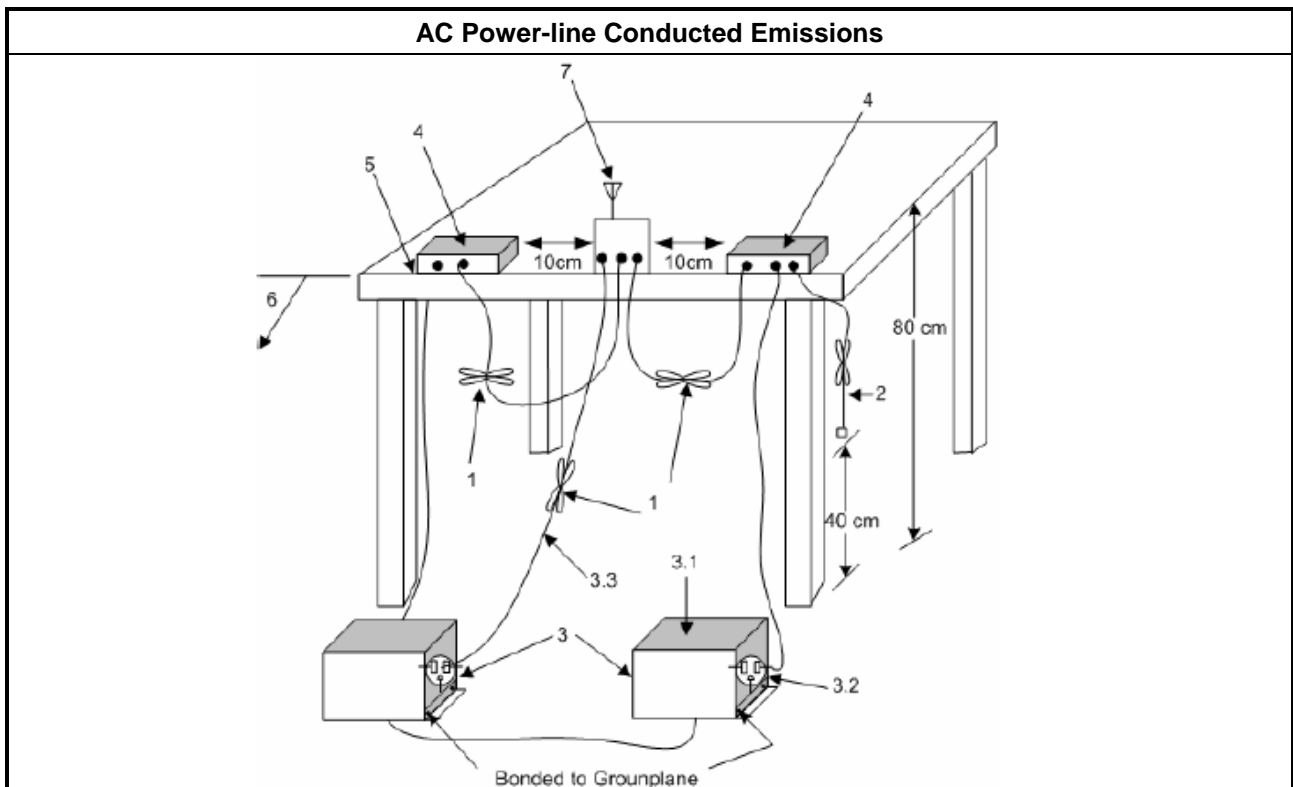
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
<ul style="list-style-type: none"> Refer as ANSI C63.10-2013, clause 6.2 foray power-line conducted emissions.

3.1.4 Test Setup





3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

Please refer to FCC 15.207 which states, "Measurements to demonstrate compliance with the conducted limits are not required for devices employ battery for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines".

Therefore, for this device, AC Power Line Conducted Emissions investigation is not required.

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit
Systems using digital modulation techniques:
<ul style="list-style-type: none"> ▪ 6 dB bandwidth \geq 500 kHz.

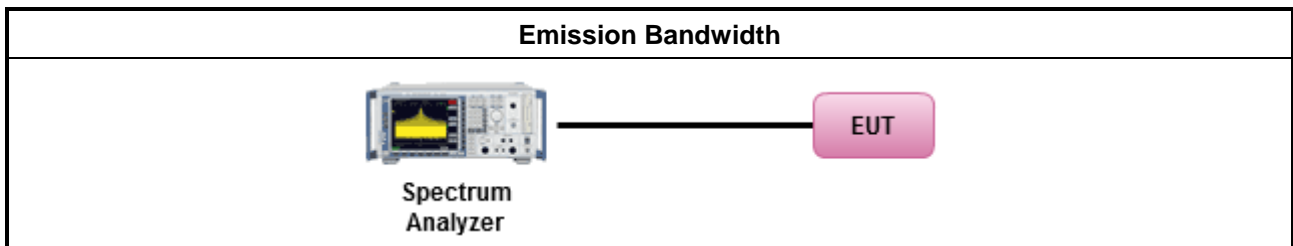
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method
<ul style="list-style-type: none"> ▪ For the emission bandwidth shall be measured using one of the options below:
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 8.2 (11.9.2.2 of ANSI C63.10) DTS bandwidth measurement.
<input type="checkbox"/> Refer as RSS-Gen, clause 6.7 for for occupied bandwidth testing.
<input type="checkbox"/> Refer as ANSI C63.10, clause 6.9.3 for occupied bandwidth testing.

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix A

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit	
	<ul style="list-style-type: none"> ▪ If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)
	<ul style="list-style-type: none"> ▪ Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm
	<ul style="list-style-type: none"> ▪ Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> ▪ Smart antenna system (SAS):
	<ul style="list-style-type: none"> - Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> - Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm
	<ul style="list-style-type: none"> - Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3 + 8$ dB dBm
e.i.r.p. Power Limit:	
	<ul style="list-style-type: none"> ▪ 2400-2483.5 MHz Band
	<ul style="list-style-type: none"> ▪ Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)
	<ul style="list-style-type: none"> ▪ Point-to-point systems (P2P): $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX}])$ dBm
	<ul style="list-style-type: none"> ▪ Smart antenna system (SAS)
	<ul style="list-style-type: none"> - Single beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	<ul style="list-style-type: none"> - Overlap beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	<ul style="list-style-type: none"> - Aggregate power on all beams: $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX} + 8])$ dBm
<p>P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi.</p>	

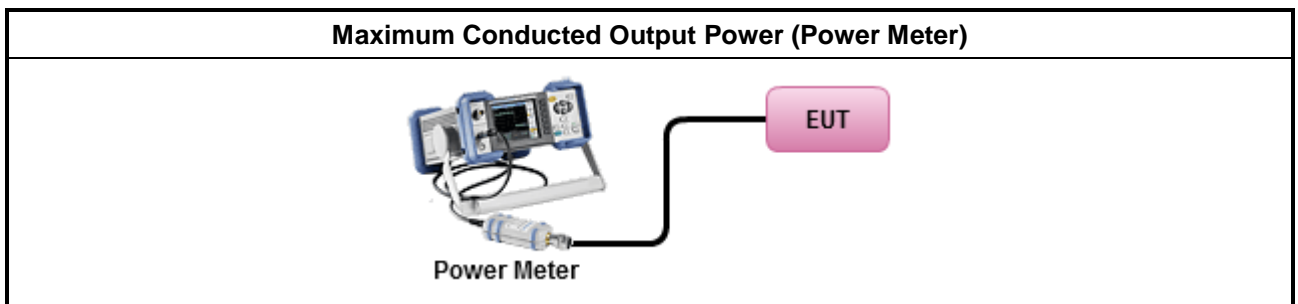
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> ▪ Maximum Peak Conducted Output Power 	
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.1.1 (11.9.1.1 of ANSI C63.10) RBW ≥ EBW method.
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.1.2 (11.9.1.2 of ANSI C63.10) integrated band power method.
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.1.3 (11.9.1.3 of ANSI C63.10) peak power meter.
<ul style="list-style-type: none"> ▪ Maximum Average Conducted Output Power 	
<input type="checkbox"/>	Refer as KDB 558074, clause 8.3.2.2 (11.9.2.2 of ANSI C63.10) using a spectrum analyzer.
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 8.3.2.3 (11.9.2.3 of ANSI C63.10) using a power meter.
<ul style="list-style-type: none"> ▪ For conducted measurement. 	
<ul style="list-style-type: none"> ▪ If the EUT supports multiple transmit chains using options given below: Refer as KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them. 	
<ul style="list-style-type: none"> ▪ If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$ 	

3.3.4 Test Setup



3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix B

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit
<ul style="list-style-type: none"> Power Spectral Density (PSD) ≤ 8 dBm/3kHz

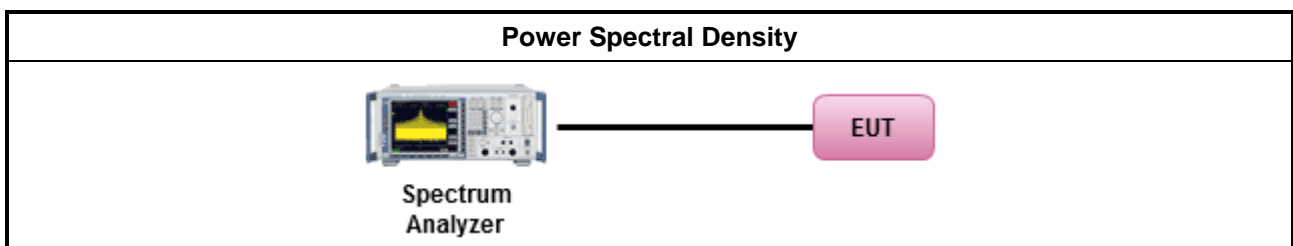
3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

Test Method
<ul style="list-style-type: none"> Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 8.4 (11.10 of ANSI C63.10) Method PKPSD.
<ul style="list-style-type: none"> For conducted measurement. <ul style="list-style-type: none"> If The EUT supports multiple transmit chains using options given below: <ul style="list-style-type: none"> Measure and sum the spectra across the outputs. Refer as KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.

3.4.4 Test Setup



3.4.5 Test Result of Power Spectral Density

Refer as Appendix C

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	Limit (dB)
Peak output power procedure	20
Average output power procedure	30

Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

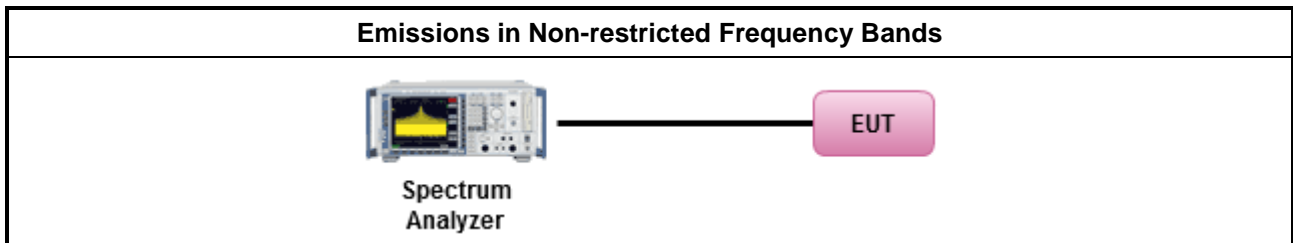
3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

Test Method
<ul style="list-style-type: none"> Refer as KDB 558074, clause 8.5 (11.11 of ANSI C63.10) for non-restricted frequency bands.

3.5.4 Test Setup



3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix D

3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB / decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

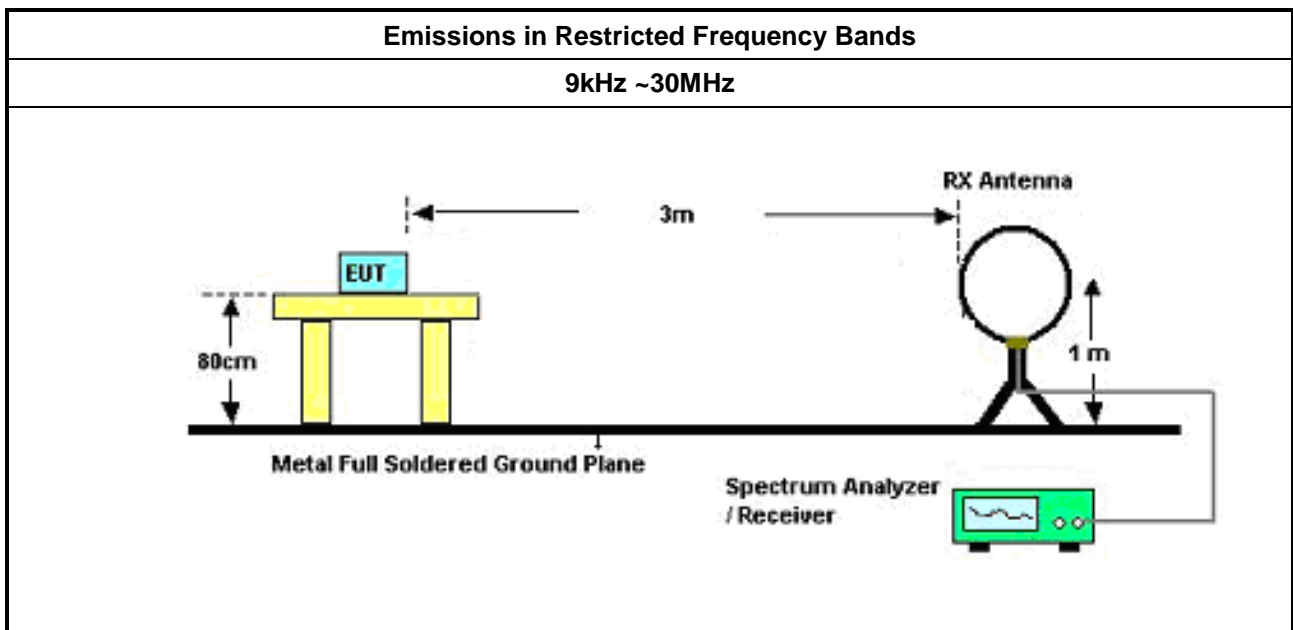
3.6.2 Measuring Instruments

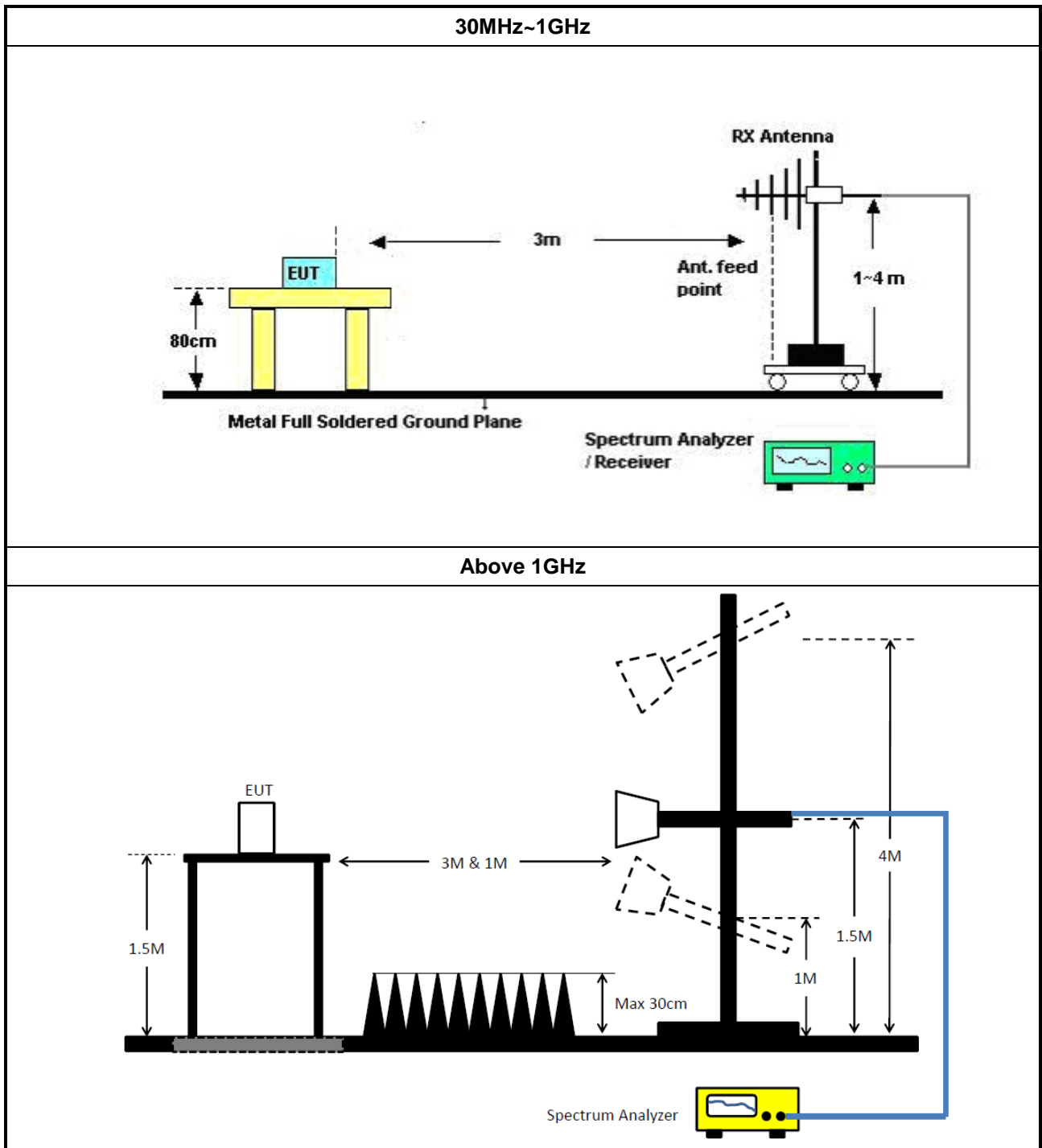
Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> The average emission levels shall be measured in [duty cycle \geq 98 or duty factor]. 	
<ul style="list-style-type: none"> Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band. 	
<ul style="list-style-type: none"> For the transmitter unwanted emissions shall be measured using following options below: 	
	<ul style="list-style-type: none"> Refer as KDB 558074, clause 8.6 (11.12 of ANSI C63.10) for restricted frequency bands.
<ul style="list-style-type: none"> For the transmitter band-edge emissions shall be measured using following options below: 	
	<ul style="list-style-type: none"> Refer as KDB 558074 clause 8.7.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.
	<ul style="list-style-type: none"> Refer as KDB 558074, clause 8.7.2 (6.10.6 of ANSI C63.10) for marker-delta method for band-edge measurements.
	<ul style="list-style-type: none"> Refer as KDB 558074, clause 8.7.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).

3.6.4 Test Setup





3.6.5 Test Result of Emissions in Restricted Frequency Bands (Below 30MHz)

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

3.6.6 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix E

4 Test Equipment and Calibration Data

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101500	10Hz ~ 40GHz	18/Jul/2018	17/Jul/2019
Power Sensor	Anritsu	MA2411B	1339407	300MHz ~ 40GHz	06/Nov/2017	05/Nov/2018
Power Meter	Anritsu	ML2495A	1517010	300MHz ~ 40GHz	06/Nov/2017	05/Nov/2018
RF Cable-1m	HUBER+SUHNER	MY37333/4	RF Cable - 45	1GHz~18GHz	26/Jan/2018	25/Jan/2019
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10710/4	30MHz ~ 26.5GHz	26/Jan/2018	25/Jan/2019
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10709/4	30MHz ~ 26.5GHz	26/Jan/2018	25/Jan/2019
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	26/Jul/2018	25/Jul/2019

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	17/Oct/2018	16/Oct/2019
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 18GHz 3m	17/Oct/2018	16/Oct/2019
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	27Jul/2018	02/Jul/2019
Microwave Preamp	Agilent	8449B	3008A02373	1GHz ~ 26.5GHz	23/Oct/2018	22/Oct/2019
Spectrum Analyzer	Rohde & Schwarz	FSP40	100593	9KHz - 40GHz	12/Dec/2017	11/Dec/2018
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100354	9kHz ~ 2.75GHz	08/Dec/2017	07/Dec/2018
RF Cable-R03m	Jye Bao	RG142	CB017	9kHz ~ 1GHz	19/Jan/2018	18/Jan/2019
RF Cable-high	SUHNER	SUCOFLEX104	MY34918/4	1GHz ~ 40GHz	19/Jan/2018	18/Jan/2019
Bilog Antenna	SCHAFFNER	CBL 6112B	2723	30MHz ~ 1GHz	13/Oct/2018	12/Oct/2019
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170154	18GHz ~ 40GHz	06/Feb/2018	05/Feb/2019
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120D	BBHA 9120 D 1531	1GHz ~ 18GHz	18/Apr/ 2018	17/Apr/2019
Preamp	MITEQ	TTA1840-35-HG	1864481	18GHz ~ 40GHz	24/Aug/2018	23/Aug/2019
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	29/Mar/2018	28/Mar/2019



Summary

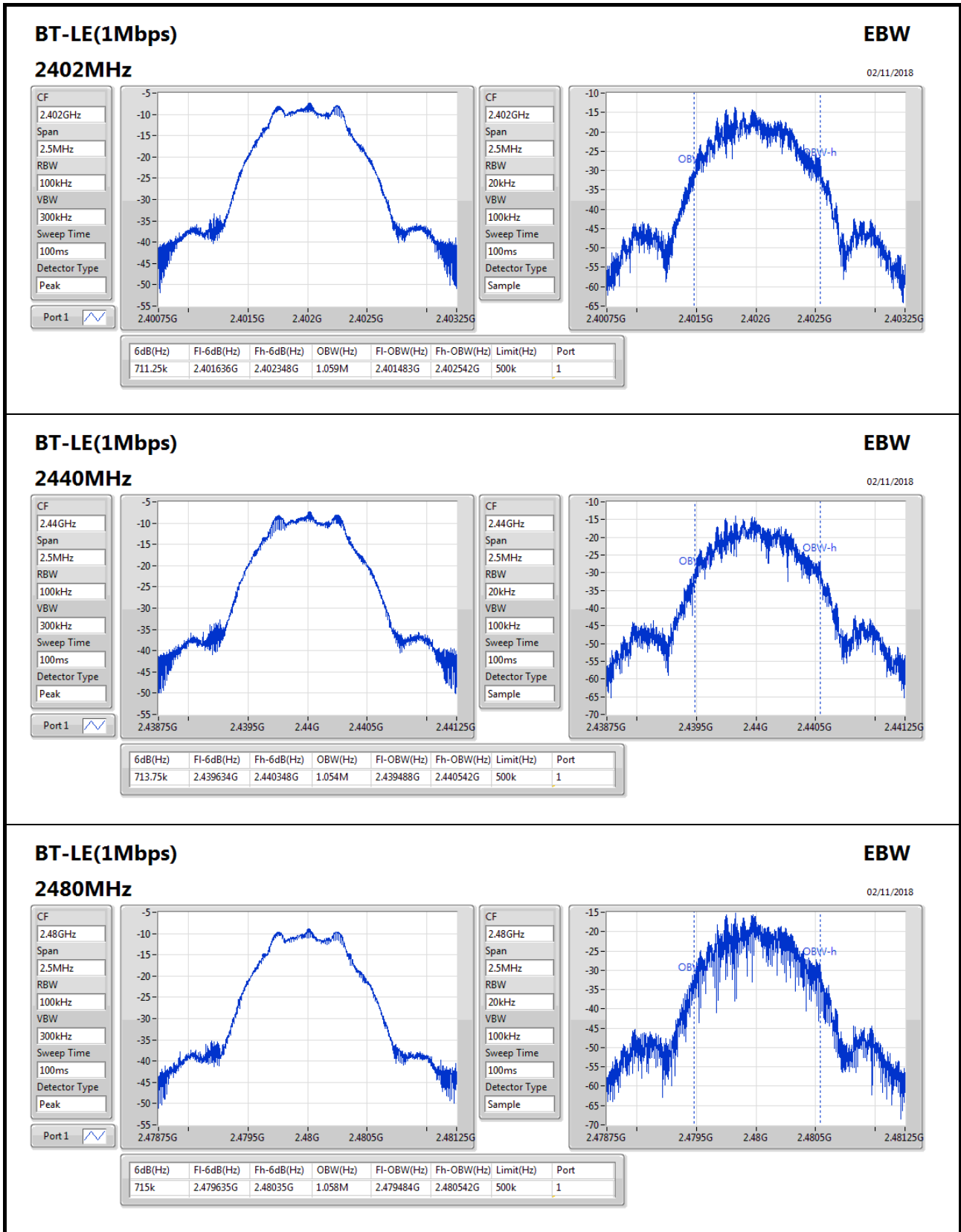
Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
BT-LE(1Mbps)	715k	1.059M	1M06F1D	711.25k	1.054M

Max-N dB = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 6dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	500k	711.25k	1.059M
2440MHz_TnomVnom	Pass	500k	713.75k	1.054M
2480MHz_TnomVnom	Pass	500k	715k	1.058M

Port X-N dB = Port X 6dB down bandwidth; **Port X-OBW** = Port X 99% occupied bandwidth;





Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	-9.88	0.00010

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	2.09	-10.08	30.00
2440MHz_TnomVnom	Pass	2.09	-9.88	30.00
2480MHz_TnomVnom	Pass	2.09	-10.28	30.00



Summary

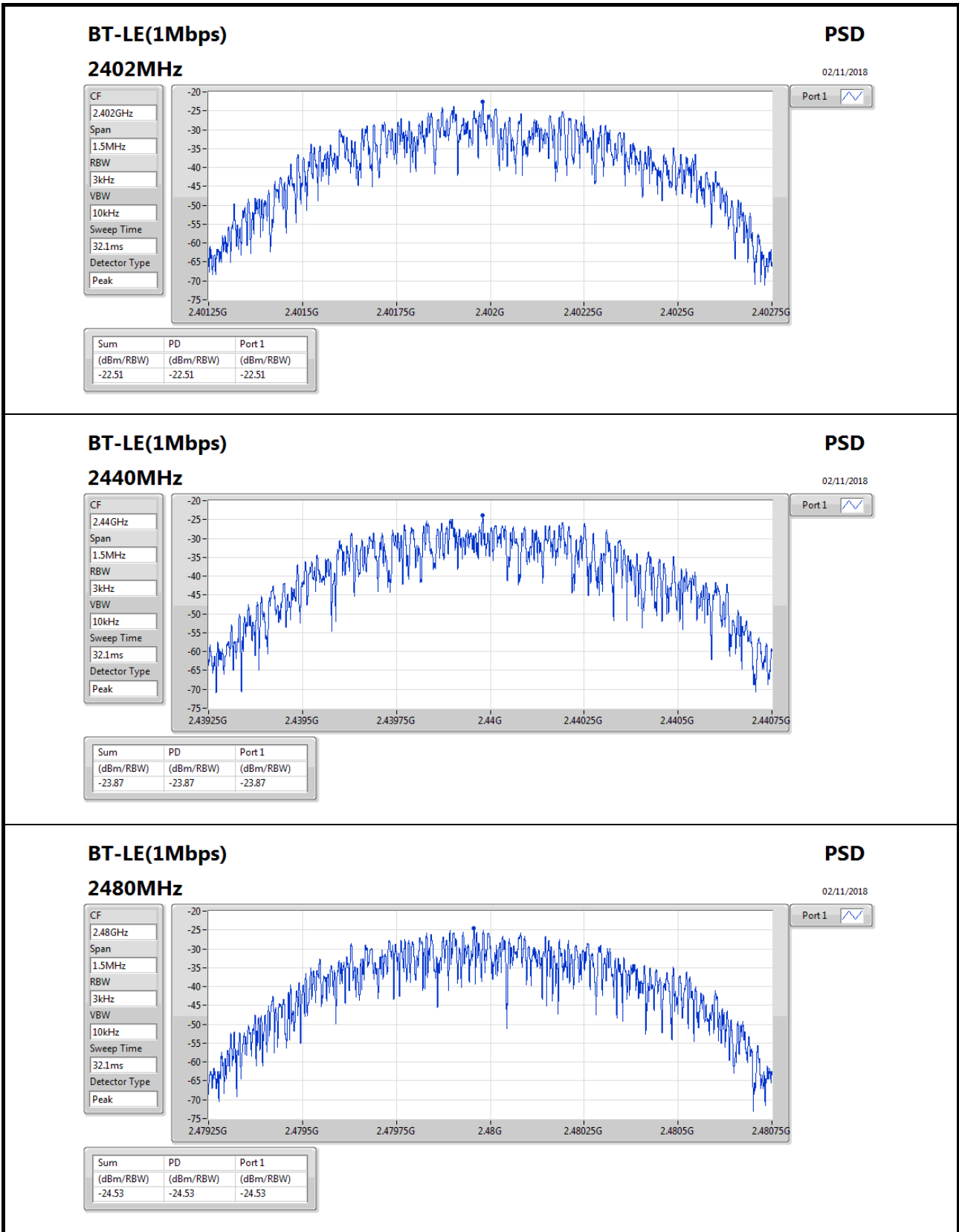
Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-22.51

RBW=3kHz.

Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	2.09	-22.51	8.00
2440MHz_TnomVnom	Pass	2.09	-23.87	8.00
2480MHz_TnomVnom	Pass	2.09	-24.53	8.00

RBW=3kHz.



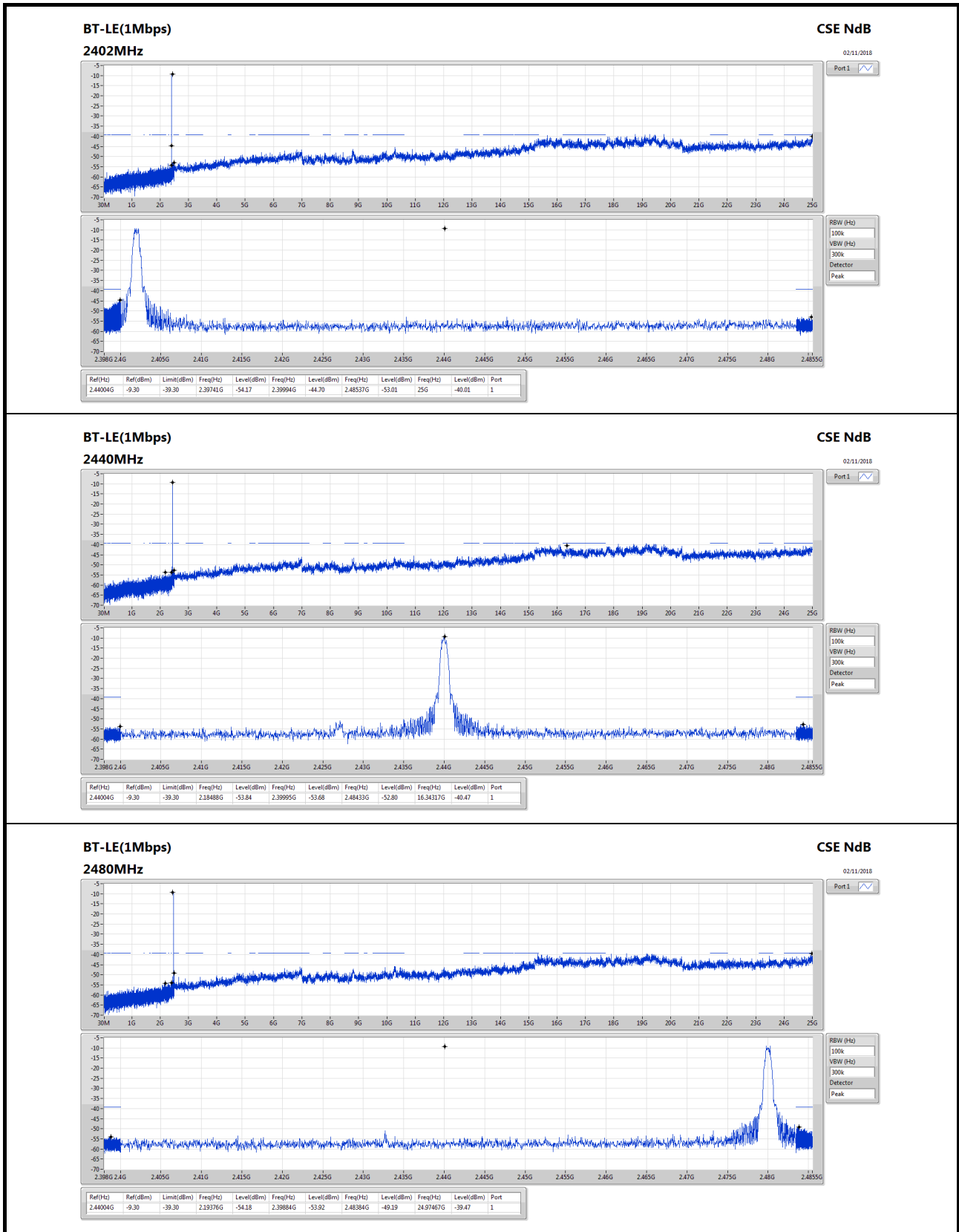


Summary

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.44004G	-9.30	-39.30	2.19376G	-54.18	2.39884G	-53.92	2.48384G	-49.19	24.97467G	-39.47	1

Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz_TnomVnom	Pass	2.44004G	-9.30	-39.30	2.39741G	-54.17	2.39994G	-44.70	2.48537G	-53.01	25G	-40.01	1
2440MHz_TnomVnom	Pass	2.44004G	-9.30	-39.30	2.18488G	-53.84	2.39995G	-53.68	2.48433G	-52.80	16.34317G	-40.47	1
2480MHz_TnomVnom	Pass	2.44004G	-9.30	-39.30	2.19376G	-54.18	2.39884G	-53.92	2.48384G	-49.19	24.97467G	-39.47	1





Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	PK	30M	34.63	40.00	-5.37	-4.17	3	Vertical	360	3.00	-



Result

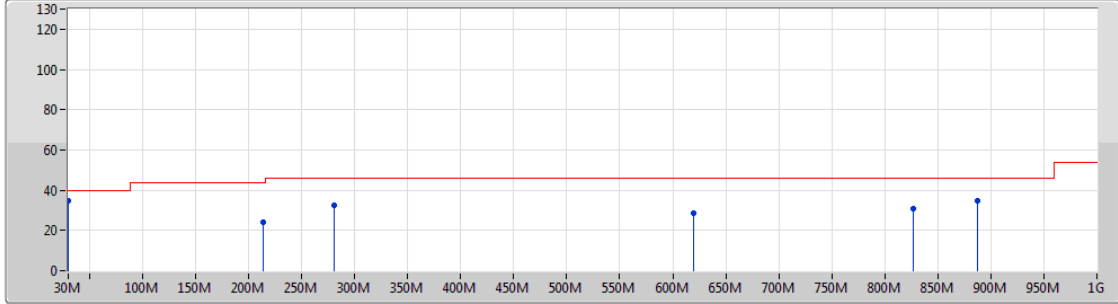
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	30M	34.63	40.00	-5.37	-4.17	3	Vertical	360	3.00	-
2440MHz	Pass	PK	214.3M	24.10	43.50	-19.40	-10.08	3	Vertical	360	3.00	-
2440MHz	Pass	PK	280.26M	32.68	46.00	-13.32	-5.73	3	Vertical	360	3.00	-
2440MHz	Pass	PK	619.76M	28.84	46.00	-17.16	0.07	3	Vertical	360	3.00	-
2440MHz	Pass	PK	827.34M	30.76	46.00	-15.24	1.97	3	Vertical	360	3.00	-
2440MHz	Pass	PK	887.48M	34.54	46.00	-11.46	2.61	3	Vertical	360	3.00	-
2440MHz	Pass	PK	31.94M	30.96	40.00	-9.04	-5.09	3	Horizontal	0	3.00	-
2440MHz	Pass	PK	214.3M	34.99	43.50	-8.51	-10.08	3	Horizontal	0	3.00	-
2440MHz	Pass	PK	286.08M	30.72	46.00	-15.28	-5.56	3	Horizontal	0	3.00	-
2440MHz	Pass	PK	383.08M	27.54	46.00	-18.46	-3.68	3	Horizontal	0	3.00	-
2440MHz	Pass	PK	738.1M	30.75	46.00	-15.25	1.18	3	Horizontal	0	3.00	-
2440MHz	Pass	PK	887.48M	32.40	46.00	-13.60	2.61	3	Horizontal	0	3.00	-



BT-LE(1Mbps)

06/11/2018

2440MHz_Battery



Legend for the plot:

- Lim.PK: Red line with a downward-pointing triangle
- PK: Blue line with a downward-pointing triangle
- Lim.AV: Red line with an upward-pointing triangle
- AV: Blue line with an upward-pointing triangle

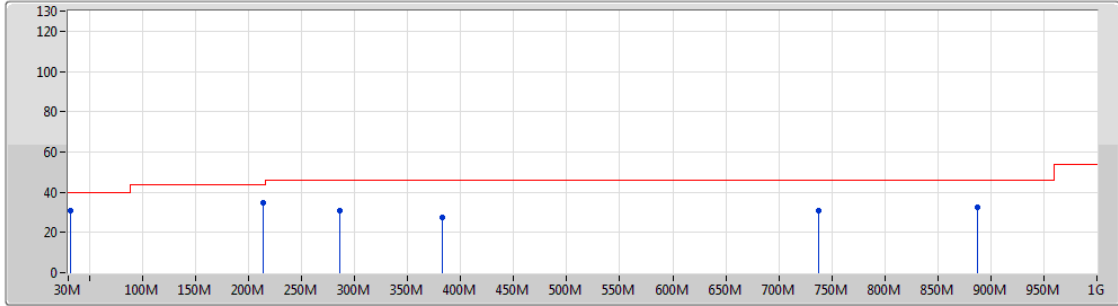
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	30M	34.63	40.00	-5.37	-4.17	3	Vertical	360	3.00	-
PK	214.3M	24.10	43.50	-19.40	-10.08	3	Vertical	360	3.00	-
PK	280.26M	32.68	46.00	-13.32	-5.73	3	Vertical	360	3.00	-
PK	619.76M	28.84	46.00	-17.16	0.07	3	Vertical	360	3.00	-
PK	827.34M	30.76	46.00	-15.24	1.97	3	Vertical	360	3.00	-
PK	887.48M	34.54	46.00	-11.46	2.61	3	Vertical	360	3.00	-



BT-LE(1Mbps)

06/11/2018

2440MHz_Battery



Lim.PK
 PK
 Lim.AV
 AV

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	31.94M	30.96	40.00	-9.04	-5.09	3	Horizontal	0	3.00	-
PK	214.3M	34.99	43.50	-8.51	-10.08	3	Horizontal	0	3.00	-
PK	286.08M	30.72	46.00	-15.28	-5.56	3	Horizontal	0	3.00	-
PK	383.08M	27.54	46.00	-18.46	-3.68	3	Horizontal	0	3.00	-
PK	738.1M	30.75	46.00	-15.25	1.18	3	Horizontal	0	3.00	-
PK	887.48M	32.40	46.00	-13.60	2.61	3	Horizontal	0	3.00	-



Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	2.4982G	49.81	54.00	-4.19	32.67	3	Horizontal	255	3.00	-



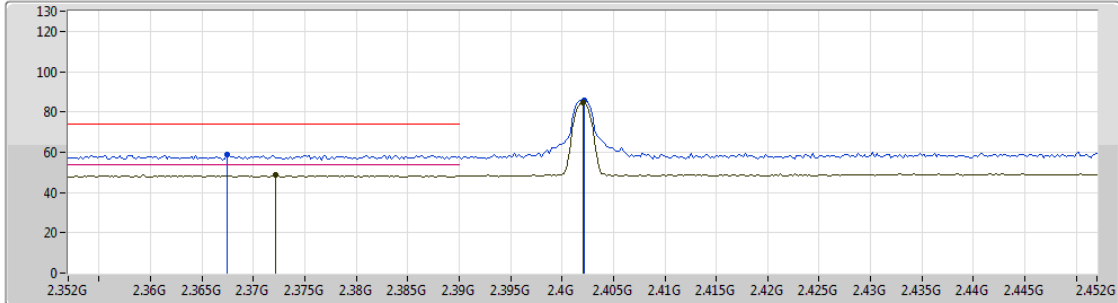
Result




Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	AV	2.3722G	48.56	54.00	-5.44	32.21	3	Vertical	35	3.19	-
2402MHz	Pass	AV	2.402G	84.78	Inf	-Inf	32.31	3	Vertical	35	3.19	-
2402MHz	Pass	PK	2.3674G	58.75	74.00	-15.25	32.19	3	Vertical	35	3.19	-
2402MHz	Pass	PK	2.4022G	85.52	Inf	-Inf	32.32	3	Vertical	35	3.19	-
2402MHz	Pass	AV	2.3526G	48.79	54.00	-5.21	32.14	3	Horizontal	249	2.51	-
2402MHz	Pass	AV	2.402G	85.95	Inf	-Inf	32.31	3	Horizontal	249	2.51	-
2402MHz	Pass	PK	2.3854G	58.67	74.00	-15.33	32.25	3	Horizontal	249	2.51	-
2402MHz	Pass	PK	2.4022G	86.64	Inf	-Inf	32.32	3	Horizontal	249	2.51	-
2402MHz	Pass	AV	4.80406G	39.71	54.00	-14.29	2.99	3	Vertical	198	3.09	-
2402MHz	Pass	PK	4.80436G	47.65	74.00	-26.35	2.99	3	Vertical	198	3.09	-
2402MHz	Pass	AV	4.80358G	38.86	54.00	-15.14	2.99	3	Horizontal	214	3.15	-
2402MHz	Pass	PK	4.80448G	47.76	74.00	-26.24	2.99	3	Horizontal	214	3.15	-
2440MHz	Pass	AV	2.34G	48.36	54.00	-5.64	32.10	3	Vertical	27	3.14	-
2440MHz	Pass	AV	2.44G	86.38	Inf	-Inf	32.46	3	Vertical	27	3.14	-
2440MHz	Pass	AV	2.4968G	49.55	54.00	-4.45	32.66	3	Vertical	27	3.14	-
2440MHz	Pass	PK	2.3456G	58.79	74.00	-15.21	32.11	3	Vertical	27	3.14	-
2440MHz	Pass	PK	2.4404G	87.20	Inf	-Inf	32.46	3	Vertical	27	3.14	-
2440MHz	Pass	PK	2.4956G	60.36	74.00	-13.64	32.65	3	Vertical	27	3.14	-
2440MHz	Pass	AV	2.3864G	48.63	54.00	-5.37	32.26	3	Horizontal	250	2.75	-
2440MHz	Pass	AV	2.44G	86.23	Inf	-Inf	32.46	3	Horizontal	250	2.75	-
2440MHz	Pass	AV	2.4904G	49.78	54.00	-4.22	32.64	3	Horizontal	250	2.75	-
2440MHz	Pass	PK	2.3832G	59.10	74.00	-14.90	32.25	3	Horizontal	250	2.75	-
2440MHz	Pass	PK	2.4404G	86.94	Inf	-Inf	32.46	3	Horizontal	250	2.75	-
2440MHz	Pass	PK	2.4868G	60.12	74.00	-13.88	32.62	3	Horizontal	250	2.75	-
2440MHz	Pass	AV	4.88G	40.82	54.00	-13.18	3.16	3	Vertical	196	2.87	-
2440MHz	Pass	PK	4.88024G	48.40	74.00	-25.60	3.16	3	Vertical	196	2.87	-
2440MHz	Pass	AV	4.87982G	40.56	54.00	-13.44	3.16	3	Horizontal	214	1.02	-
2440MHz	Pass	PK	4.87964G	48.74	74.00	-25.26	3.16	3	Horizontal	214	1.02	-
2480MHz	Pass	AV	2.48G	83.57	Inf	-Inf	32.60	3	Vertical	0	2.71	-
2480MHz	Pass	AV	2.4888G	49.77	54.00	-4.23	32.63	3	Vertical	0	2.71	-
2480MHz	Pass	PK	2.4802G	84.42	Inf	-Inf	32.60	3	Vertical	0	2.71	-
2480MHz	Pass	PK	2.4902G	60.49	74.00	-13.51	32.64	3	Vertical	0	2.71	-
2480MHz	Pass	AV	2.48G	86.17	Inf	-Inf	32.60	3	Horizontal	255	3.00	-
2480MHz	Pass	AV	2.4982G	49.81	54.00	-4.19	32.67	3	Horizontal	255	3.00	-
2480MHz	Pass	PK	2.4802G	86.85	Inf	-Inf	32.60	3	Horizontal	255	3.00	-
2480MHz	Pass	PK	2.4835G	62.20	74.00	-11.80	32.61	3	Horizontal	255	3.00	-
2480MHz	Pass	AV	4.9597G	40.05	54.00	-13.95	3.33	3	Vertical	199	2.63	-
2480MHz	Pass	PK	4.96018G	48.62	74.00	-25.38	3.33	3	Vertical	199	2.63	-
2480MHz	Pass	AV	4.95982G	40.96	54.00	-13.04	3.33	3	Horizontal	213	1.50	-
2480MHz	Pass	PK	4.95958G	48.74	74.00	-25.26	3.33	3	Horizontal	213	1.50	-

BT-LE(1Mbps)

02/11/2018

2402MHz_TX



Lim.PK 
 PK 
 Lim.AV 
 AV 

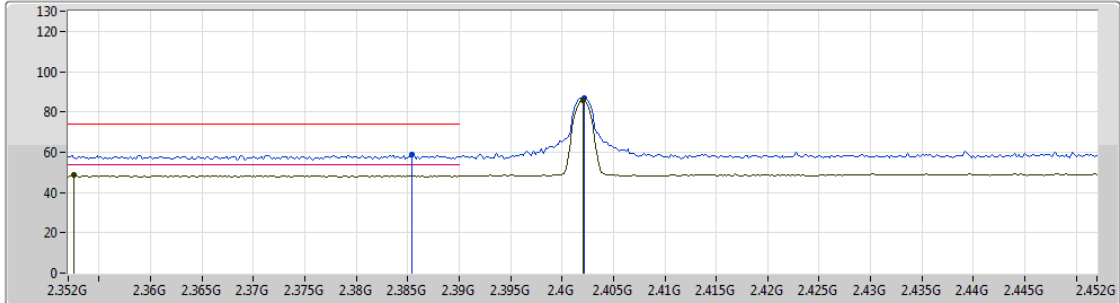
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3722G	48.56	54.00	-5.44	32.21	3	Vertical	35	3.19	-
AV	2.402G	84.78	Inf	-Inf	32.31	3	Vertical	35	3.19	-
PK	2.3674G	58.75	74.00	-15.25	32.19	3	Vertical	35	3.19	-
PK	2.4022G	85.52	Inf	-Inf	32.32	3	Vertical	35	3.19	-



BT-LE(1Mbps)

02/11/2018

2402MHz_TX



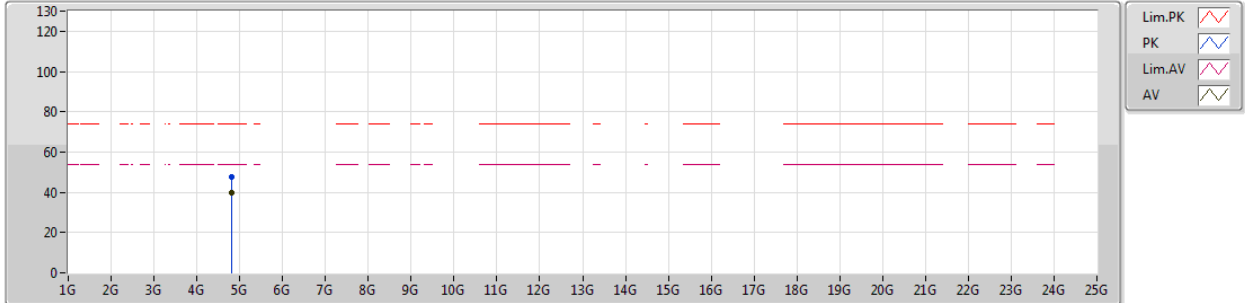
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3526G	48.79	54.00	-5.21	32.14	3	Horizontal	249	2.51	-
AV	2.402G	85.95	Inf	-Inf	32.31	3	Horizontal	249	2.51	-
PK	2.3854G	58.67	74.00	-15.33	32.25	3	Horizontal	249	2.51	-
PK	2.4022G	86.64	Inf	-Inf	32.32	3	Horizontal	249	2.51	-



BT-LE(1Mbps)

02/11/2018

2402MHz_TX



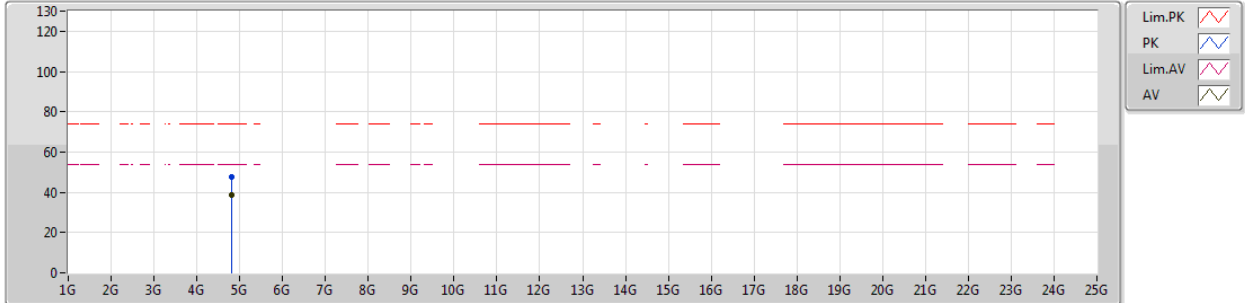
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.80406G	39.71	54.00	-14.29	2.99	3	Vertical	198	3.09	-
PK	4.80436G	47.65	74.00	-26.35	2.99	3	Vertical	198	3.09	-



BT-LE(1Mbps)

02/11/2018

2402MHz_TX

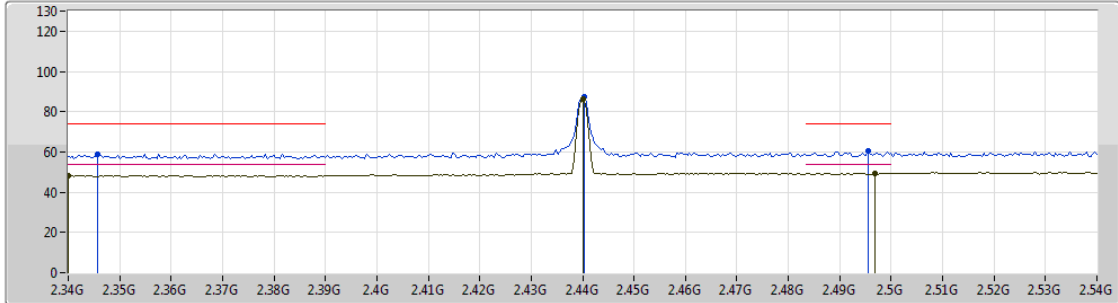


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.80358G	38.86	54.00	-15.14	2.99	3	Horizontal	214	3.15	-
PK	4.80448G	47.76	74.00	-26.24	2.99	3	Horizontal	214	3.15	-

BT-LE(1Mbps)

2440MHz_TX

02/11/2018

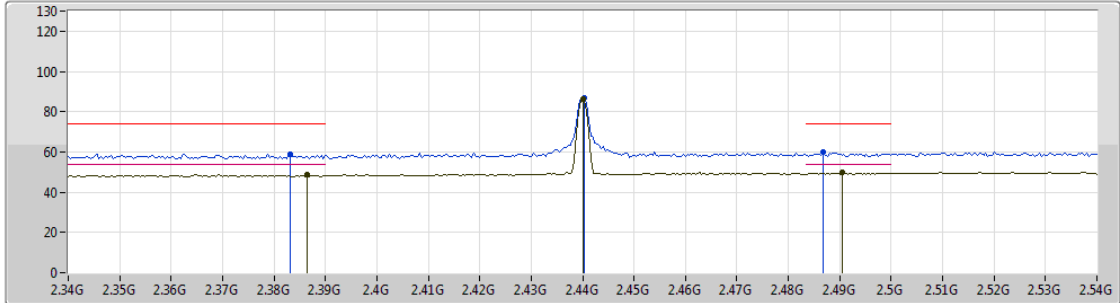






Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.34G	48.36	54.00	-5.64	32.10	3	Vertical	27	3.14	-
AV	2.44G	86.38	Inf	-Inf	32.46	3	Vertical	27	3.14	-
AV	2.4968G	49.55	54.00	-4.45	32.66	3	Vertical	27	3.14	-
PK	2.3456G	58.79	74.00	-15.21	32.11	3	Vertical	27	3.14	-
PK	2.4404G	87.20	Inf	-Inf	32.46	3	Vertical	27	3.14	-
PK	2.4956G	60.36	74.00	-13.64	32.65	3	Vertical	27	3.14	-

BT-LE(1Mbps)

2440MHz_TX

02/11/2018



Lim.PK 
 PK 
 Lim.AV 
 AV 

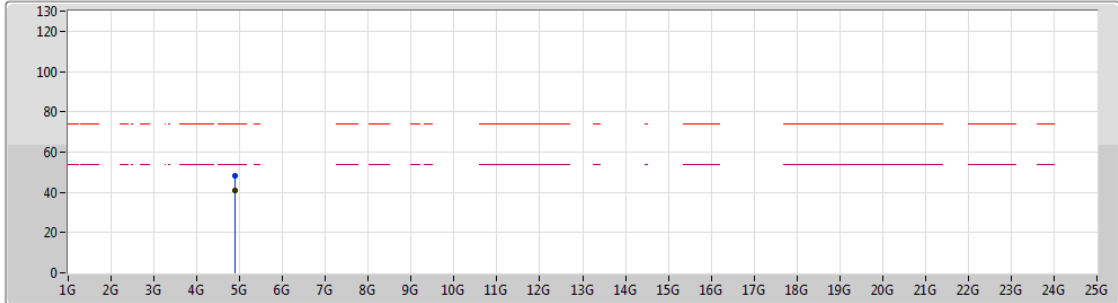
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3864G	48.63	54.00	-5.37	32.26	3	Horizontal	250	2.75	-
AV	2.44G	86.23	Inf	-Inf	32.46	3	Horizontal	250	2.75	-
AV	2.4904G	49.78	54.00	-4.22	32.64	3	Horizontal	250	2.75	-
PK	2.3832G	59.10	74.00	-14.90	32.25	3	Horizontal	250	2.75	-
PK	2.4404G	86.94	Inf	-Inf	32.46	3	Horizontal	250	2.75	-
PK	2.4868G	60.12	74.00	-13.88	32.62	3	Horizontal	250	2.75	-



BT-LE(1Mbps)

02/11/2018

2440MHz_TX



Lim.PK
 PK
 Lim.AV
 AV

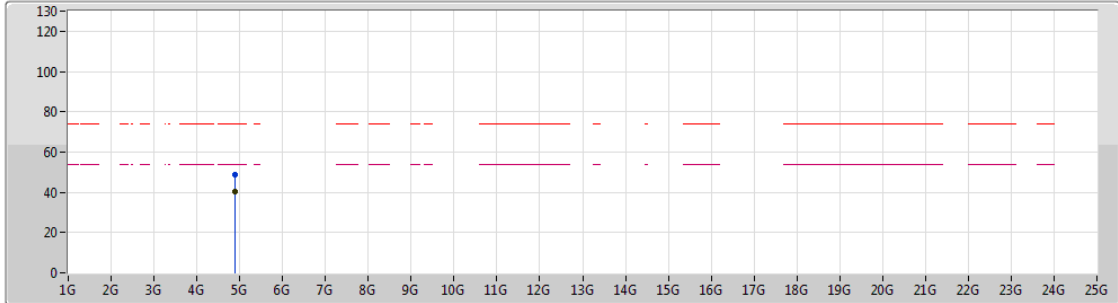
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.88G	40.82	54.00	-13.18	3.16	3	Vertical	196	2.87	-
PK	4.88024G	48.40	74.00	-25.60	3.16	3	Vertical	196	2.87	-



BT-LE(1Mbps)

02/11/2018

2440MHz_TX



Lim.PK
 PK
 Lim.AV
 AV

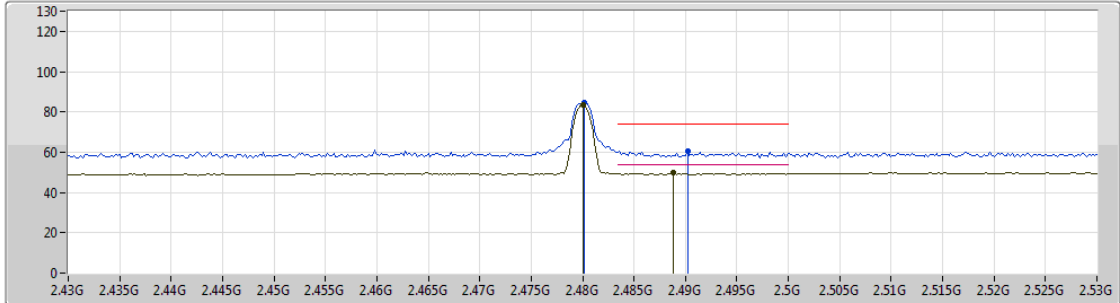
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.87982G	40.56	54.00	-13.44	3.16	3	Horizontal	214	1.02	-
PK	4.87964G	48.74	74.00	-25.26	3.16	3	Horizontal	214	1.02	-



BT-LE(1Mbps)

02/11/2018

2480MHz_TX

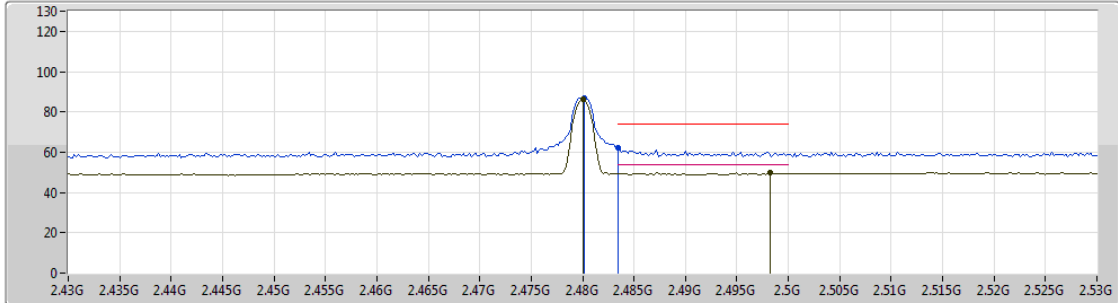




Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.48G	83.57	Inf	-Inf	32.60	3	Vertical	0	2.71	-
AV	2.4888G	49.77	54.00	-4.23	32.63	3	Vertical	0	2.71	-
PK	2.4802G	84.42	Inf	-Inf	32.60	3	Vertical	0	2.71	-
PK	2.4902G	60.49	74.00	-13.51	32.64	3	Vertical	0	2.71	-

BT-LE(1Mbps)

2480MHz_TX

02/11/2018



Lim.PK 
 PK 
 Lim.AV 
 AV 

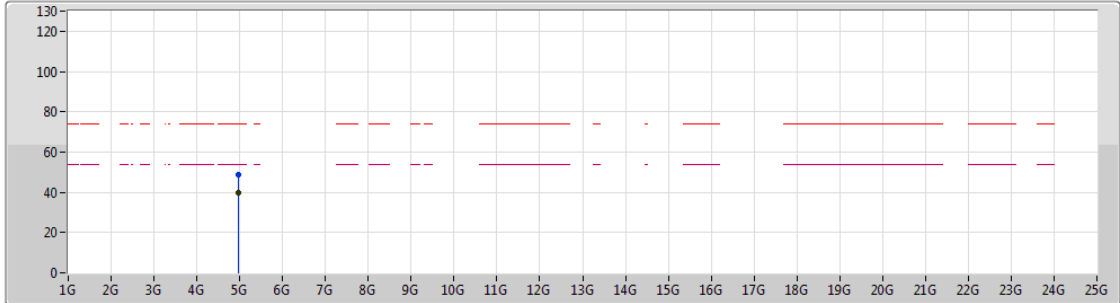
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.48G	86.17	Inf	-Inf	32.60	3	Horizontal	255	3.00	-
AV	2.4982G	49.81	54.00	-4.19	32.67	3	Horizontal	255	3.00	-
PK	2.4802G	86.85	Inf	-Inf	32.60	3	Horizontal	255	3.00	-
PK	2.4835G	62.20	74.00	-11.80	32.61	3	Horizontal	255	3.00	-



BT-LE(1Mbps)

02/11/2018

2480MHz_TX



Lim.PK
 PK
 Lim.AV
 AV

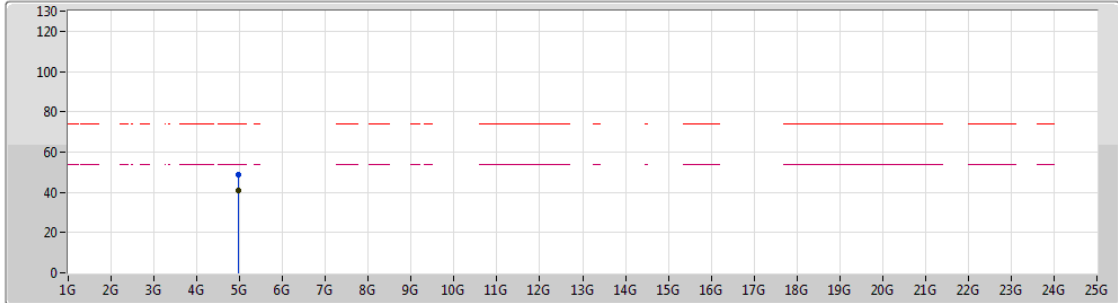
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.9597G	40.05	54.00	-13.95	3.33	3	Vertical	199	2.63	-
PK	4.96018G	48.62	74.00	-25.38	3.33	3	Vertical	199	2.63	-



BT-LE(1Mbps)

02/11/2018

2480MHz_TX



Lim.PK
 PK
 Lim.AV
 AV

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.95982G	40.96	54.00	-13.04	3.33	3	Horizontal	213	1.50	-
PK	4.95958G	48.74	74.00	-25.26	3.33	3	Horizontal	213	1.50	-